UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/059,422	01/31/2002	Nestor Alexander Bojarczuk JR.	YOR920010368US2	7372

21254 7590 05/05/2004

MCGINN & GIBB, PLLC
8321 OLD COURTHOUSE ROAD
SUITE 200
VIENNA, VA 22182-3817

EXAMINER	
DOAN, THERESA T	
ART UNIT	**PAPER NUMBER**
2814	

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/059,422	BOJARCZUK ET AL.	
	Examiner	Art Unit	
	Theresa T Doan	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02/23/04* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15-27 and 56-75* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15-27 and 56-75* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Request for Continued Examination

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 04/11/03 has been entered. An action on the RCE follows.

The amendment filed on 12/31/03 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 15, 17, 27, 56, 60, 62-63, 65, 67 and 74-75 are rejected under 35 U.S.C. 102(b) as being anticipated by Morshed et al. (Epitaxial CeO2 on silicon substrate...for SOI structures) of record.

Regarding claims 15, 56, 60, 63 and 65, Morshed et al. disclose a semiconductor structure, comprising:

a silicon substrate (figure 2);

a crystalline oxide (CeO_2) layer comprising single-crystal oxide formed over the substrate (see figure 2 and Abstract); and

an epitaxial silicon layer formed on the crystalline oxide layer (see page 339).

Regarding claim 17, Morshed et al. disclose the crystalline oxide layer comprises an oxide of at least one of the rare earth elements.

Regarding claims 27, 62 and 67, Morshed et al. disclose a semiconductor structure, including:

a silicon substrate (figure 2);

a crystalline oxide (CeO_2) surface comprising single-crystal oxide surface; and

an amorphous silicon layer formed on the crystalline oxide surface by chemical vapor deposition (see figure 2 and Abstract). It is note that the process limitation (chemical vapor deposition) would not carry patentable weight in this claim drawn to a structure, because distinct structure is not necessarily produced. In re Thorpe, 227 USPQ 964 (Fed. Cir. 1985).

Regarding claims 74-75, Morshed discloses the crystalline oxide layer is lattice-matched to silicon (see page 339).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 21, 23, 58, 61, 64 and 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morshed et al. (Epitaxial CeO2 on silicon substrate...for SOI structures) in view of Reisman et al. (4,891,329) as previously cited.

Regarding claims, Morshed teaches in figure 2 a semiconductor structure, comprising:

a silicon substrate;

a crystalline oxide (CeO_2) layer comprising single-crystal rare earth oxide formed over the substrate (see figure 2 and Abstract); and

an epitaxial silicon layer formed on the crystalline oxide layer (see page 339).

Morshed does not teach an epitaxial germanium layer formed on the crystalline oxide layer. However, Reisman et al. teach a thin layer of epitaxial non-silicon semiconductor such as germanium (Ge), gallium arsenide (GaAs) and silicon germanium alloys that formed on a crystalline layer in order to increase using in high temperature, high power, optoelectronic and radiation sensitive (figure 1C, column 1, lines 55-61). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to substitute germanium epitaxial for silicon

epitaxial in Morshed's device. Because germanium would provide the increasing uses in high temperature, high power, optoelectronic and radiation sensitive.

6. Claims 20 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morshed et al. (Epitaxial CeO2 on silicon substrate...for SOI structures) in view of Reisman et al. (4,891,329) as applied to claims 15 and 21 above and further in view of Wang et al. (6,376,337) as previously cited.

Morshed et al. do not disclose the forming of additional layers of crystalline oxide layer and at least one additional layer of silicon formed on the addition layer of crystalline oxide.

However, Wang et al. in figure 7 and column 9, lines 49-61 teach the forming of alternating layers of epitaxial insulator and epitaxially silicon. Accordingly, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to form the additional layers of mixed rare earth oxide and epitaxially silicon in Morshed's device structure in order to form the super-lattice device structure, as taught by Wang (column 12, lines 38-45).

7. Claims 16 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morshed et al. (Epitaxial CeO2 on silicon substrate...for SOI structures) of record in view of Reisman et al. (4,891,329) as applied to claims 15 and 21 above and further in view of Guenzer (5,478,653) as previously cited.

Morshed does not disclose a silicon oxide layer formed between the substrate and the crystalline oxide layer.

However, Guenzer teaches in figure 2, a silicon oxide layer 20 formed between the substrate 22 and the crystalline oxide layer 12 for promoting the growth of the crystalline oxide layer (see column 2, lines 30-33). Therefore, It would have been obvious to one having ordinary skill in the art at the time of the invention was made to form a silicon oxide layer formed between the substrate and the crystalline oxide layer in Morshed's device as taught by Guenzer to promote the growth of the crystalline oxide layer (see column 2, line 33).

8. Claims 18-19, 24-25 and 68-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morshed et al. (Epitaxial CeO2 on silicon substrate...for SOI structures) in view of Reisman et al. (4,891,329) as applied to claims 15, 21 and 27 above and further in view of Yano et al. (6,096,434).

Morshed teaches substantially the entire claimed structure, as applied to claims 15, 21 and 27 above, except for the crystalline oxide layer comprises a mixture of oxides of different rare earth elements and yttrium.

Yano discloses (in column 17, lines 13-19) the mixed rare earth oxide containing at least one member selected from the group consisting of Y, La, Ce, Sm, Eu, Gd, etc; the rare earth in the rare earth oxide can constitute two or more rare earth elements wherein their ratio is arbitrary in order to improve the lattice matching (column 17, lines 12-19). Therefore, it would have been obvious to one having ordinary skill in the art at

the time of the invention was made to substitute the mix rare earth oxide for the crystalline oxide layer in Morshed. Because the substitution of art-recognized equivalent as suggested by Yano et al. for improving the lattice matching with the substrate is within the level of ordinary skill in the art.

9. Claims 57 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morshed et al. (Epitaxial CeO2 on silicon substrate...for SOI structures) in view of Reisman et al. (4,891,329) as applied to claims 15 and 21 above and further in view of Setsune et al. (4,980,339) as previously cited.

Morshed teaches substantially the entire claimed structure, as applied to claims 15 and 21 above, except for the substrate comprises a germanium substrate.

Setsune et al. teach in figure 1 the substrate comprises a germanium substrate, which is effective as well as silicon substrate (column 2, lines 54-59). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to substitute the germanium substrate in Morshed's device. Because the substitution of art-recognized equivalent as suggested by Setsune in order to apply the device in a particular application is within the level of ordinary skill in the art.

10. Claims 71-73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morshed et al. (Epitaxial CeO2 on silicon substrate...for SOI structures) in view of Reisman et al. (4,891,329) as applied to claims 15, 21 and 27 above and further in view of Ami et al. (6,610,548) of record.

Morshed teaches substantially the entire claimed structure, as applied to claims 15, 21 and 27 above, except for the oxide layer crystallizes to have a bixbyite structure.

Ami et al. teach an oxide layer crystallizes to have a bixbyite structure for the purpose of epitaxially growing the rare earth oxide in the orientation more reliably (column 9, lines 12-57). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to form an oxide layer crystallizes to have a bixbyite structure in Morshed's device as taught by Ami et al. for the purpose of epitaxially growing the rare earth oxide in the orientation more reliably.

Response to Arguments

Applicant's arguments with respect to claims 15-27 and 56-75 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Theresa T Doan whose telephone number is (571) 272-1704. The examiner can normally be reached on Monday to Thursday from 8:00AM - 6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, WAEL FAHMY can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TD
April 21, 2004.

PHAT X. CAO
PRIMARY EXAMINER